Candidate number……

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

DEPARTMENT OF HEALTH SCIENCES

NSLS102: CLINICAL CHEMISTRY

END OF FIRST SEMESTER FINAL EXAMINATIONS

JUNE 2019

LECTURER: MR M. RONDOZAI

DURATION: 3 HOURS

INSTRUCTIONS

Write your candidate number on the space provided on top of each page
Answer **all** questions in sections A on the question paper.
Answer **all** questions in section B on separate answer sheets provided.
Answer any **3** questions in section C on separate answer sheets provided
The mark allocation for each question is indicated at the end of the question
Credit will be given for logical, systematic and neat presentations in sections B and C

SECTION A (40 MARKS)

20 multiple choice (True/False) questions with 4 alternatives per question

Each correct response carries half a mark

All questions are compulsory

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1. The following statements are True/False
   a) Quality Control is not a component of Quality Assurance
   b) Performance of Quality control is not necessary after calibrating analytical equipment
   c) External Quality Assurance can involve On-site Evaluation
   d) Results can be reported even when controls have failed.

2. The following statements are true about enzymes.
   a) An apoenzyme is made up of a holoenzyme and a cofactor.
   b) All enzymes exhibit absolute specificity.
   c) Serum alkaline phosphatase measurements are specific to liver diseases.
   d) NAD absorbs light at 340nm but not NADH.

3. The following statements are not true of Lactate dehydrogenase
   a) It has 4 isoenzymes
   b) It is involved in conversion of lactate to pyruvate
   c) In the above reaction NADH is converted to NAD
   d) The enzyme is involved in phosphoryration

4. The following statements are true
   a) Reactions catalyzed by dehydrogenases require Adenosine Triphosphate (ATP)
   b) Reactions catalyzed by kinases require ATP and NADH.
   c) Reactions catalyzed by kinases require ATP
   d) The hexokinase reaction catalyzes the second reaction in the Glycolytic Pathway.

5. The following hormones are not involved in regulation of glucose in blood T/F
   a) Glucagon
   b) Insulin
   c) Somatostatin
   d) Cortisol

6. The following statements are true about enzymes

a) The M form of LDH is predominantly found in white skeletal muscle.

b) The H of LDH form exhibits a strong negative charge and will migrate towards the positive terminal.

c) Creatine kinase is associated with regeneration and storage of ATP in muscle

d) Electrophoresis is the reference method for creatine kinase isoenzyme determination.

7. The following statements are true about electrophoresis

a) DNA carries a net negative charge and will migrate to the positive terminal.

b) SDS PAGE separates proteins based on molecular weight and charge.

c) Temperature and viscosity of buffer may affect rate of migration.

d) Increased concentration of buffer ions hinders migration of substances.

8. Tests elevated in plasma within 24 hours of a myocardial infarction are

a) CK-MB

b) Myoglobin

c) Haemoglobin

d) CK-MM

9. These statements are true of spectrophotometry,

a) Incident light is stronger than transmitted light

b) Monochromators measure absorbed light

c) Transmittance is directly proportional to concentration of the analyte

d) DNA concentrations can be measured

10. Risk factors for developing gout are;

a) Pregnancy
b) Male gender
c) Obesity
d) Alcohol consumption

11. The following are secreted into the stomach

a) Pepsin
b) Lipases
c) Gastrin
d) Intrinsic factor

12. Elevation of the following enzyme levels in circulation indicate cholestasis
    a) AST
    b) GGT
    c) ALT
    d) ALP

13. Tests for detection of gastrointestinal disorders are,
    a) Xylose breath test
    b) Creatinine
    c) Faecal fat test
    d) Plasma amylase

14. In bilirubin metabolism
    a) Haemolysis elevates conjugated bilirubin only
    b) Stercobilin is excreted through the kidneys
    c) Urine urobilinogen levels rise in post hepatic obstruction
    d) Conjugated bilirubin is also known as direct bilirubin

15. The following are reducing sugars, T/F
    a) Sucrose
    b) Maltose
    c) Galactose
    d) Cellulose

16. The following are monosaccharides, T/F
    a) Sucrose
    b) Galactose
    c) Glucose
    d) Lactose

17. The following enzymes are involved in the glycolytic pathway, T/F
    a) Glucose 6 phosphate dehydrogenase
    b) Phosphofructokinase
    c) Pyruvate kinase
    d) Lactate dehydrogenase

18. Concerning protein structure, T/F

a) Heat denatures protein through bond formation
b) The secondary structure involves formation of B-pleated sheets
c) Size of protein is related to number of functions
d) Primary structure is determined by nucleotide sequences

19. Human specimens processed in a Chemical Pathology laboratory include T/F
    a) Faeces
    b) Plasma
    c) Cerebrospinal fluid
    d) Urine

20. The following tests aid in diagnosis of diabetes mellitus T/F
    a) Urinalysis
    b) Fasting blood sugar
    c) Oral glucose tolerance test
    d) Plasma uric acid

SECTION B (20 MARKS)

Short answer questions

All questions are compulsory

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1. State a disorder/condition which is investigated using each of the tests below [5]

    a) Total protein electrophoresis

    b) Carbohydrate chromatograghy

    c) Amino acid chromatography

    d) Serum amylase

    e) Glycosylated Haemoglobin

2. Define,

    a) an isoenzyme. (2)

    b) Holoenzyme (2)

    c) Apoenzyme (2)

    d) enzyme activity (2)

    e) Coenyzme (2)

3. Define competitive and non-competitive inhibition. (5)

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SECTION C (75 MARKS)

Answer any 3 questions
Each question carries 25 marks
Start each question on a new page.

1. Draw the basic components of a spectrophotometer. Briefly describe the function of each component. (25)

2. Citing relevant examples, discuss the pre-analytical, analytical and post analytical factors that are likely to influence test results in a Chemical Pathology laboratory, and their redress. [25]

3. Discuss the diagnostic utility of the following enzymes
   a) Creatine kinase (CK) [10]
   b) Alanine aminotransferase (ALT) [5]
   c) Gamma glutamyl transferase (GGT) [5]
   d) Serum amylase [5]

4. Discuss how the following factors influence enzyme activity
   a) Substrate concentration [8]
   b) Inhibitors [8]
   c) Temperature [5]
   d) pH [4]

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5. a) Calculate the molarity of i) 50 gms /litre Sodium hydroxide M.w. 40 (2)
   ii) Saline M.W NaCL = 58.44 (2)
   iii) 150milligms/decilitre Glucose solution
   Glucose = M.w. 180 (3)
   iv) 100 milligms/decilitre Urea solution
   Urea M.w.= 60 (3)

   b) Calculate the molarity of Sulphuric acid given that;

   - Molecular weight is 98.08
   - Purity 96%
   - Specific Gravity 1.83 (5)

   c) What is Multiple myeloma? What screening and confirmatory biochemical tests would a doctor request to confirm clinical diagnosis discussing the outcome of your results. (10)

END OF PAPER